

# PATENT SPECIFICATION

(11) 1201435

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## DRAWINGS ATTACHED

- (21) Application No. 6002/68 (22) Filed 7 Feb. 1968  
 (23) Complete Specification filed 5 Feb. 1969  
 (45) Complete Specification published 5 Aug. 1970  
 (51) International Classification B 21 d 39/08  
 (52) Index at acceptance  
     B3J 15  
     F2E 1F 2L4 3B  
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## (54) A DEVICE FOR CORRECTING OUT-OF-ROUNDNESS IN PIPES

(71) We, R. OGDEN & COMPANY (PIPE-LINE CONSTRUCTORS) LIMITED, a British Company of Boughton Trading Estate, New Ollerton, Nottinghamshire, do hereby declare the invention for which we pray that a Patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention concerns a device for correcting such out-of-roundness as may occur in pipes, particularly butt-welded pipes of relatively large diameter.

15 The invention therefore provides a device for correcting out-of-roundness in pipes and for conforming the internal periphery thereof to a substantially circular cross-sectional shape, which device is adapted to be received in the pipe and to be moved lengthwise along it and comprises a trolley or carriage constructed to be supported by said internal periphery, a series of radiating hydraulic rams on the carriage or trolley and a circumferential series of formers connected to the rams for radial projection within the pipe by operation of the rams, each of which formers has an arcuate outer peripheral surface conforming to an arc of the desired circle which peripheral surfaces, in the projected position, constitute successive and closely adjacent arcs of that circle.

30 The device may have an automatically-applied but releasable brake for engaging the pipe interior and thereby preventing the device from running back.

35 There may be a single series of the rams and formers, or there may be two series.

40 In order that the invention may be better understood, reference will now be made to the accompanying drawings which are to some extent diagrammatic and in which:

Figure 1 is a sectional elevation of the device;

Figure 2 is a front elevation (viewed on

the line A—A in Figure 1) showing the chief components of the device,

Figure 3 is a plan view, on a larger scale, showing a brake.

The device comprises a series of radiating hydraulic rams 10 mounted on the central body 11, so that their angular spacing is equal. This central body 11 carries a hydraulic distributor 12 by which hydraulic fluid under pressure is distributed simultaneously to all the rams which are thus simultaneously extended. It will be understood that the hydraulic fluid is supplied under pressure from any suitable source and is controlled by a suitable valve mechanism.

The plunger 14 of each ram carries a former 15. The latter has an arcuate outer peripheral surface which conforms to an arc of the desired circle to which it is required to shape the interior periphery of a pipe so as to correct any out-of-roundness which may exist. As will be seen, in the expanded condition of the device, these peripheral surfaces constitute successive equal and closely adjacent arcs of the desired circle, there being a narrow gap 16 between the ends of the adjacent formers which is sufficient to permit the formers to be retracted from their expanded position to the extent required to permit the device to be inserted into a pipe and moved along it. It will be appreciated that when the device is expanded inside a pipe the formers force the pipe interior to conform to the desired circle.

Desirably, the formers are suitably guided in their radial movements by guide means additional to the rams 10. For example there may be provided with guide bolts 17a, 17b working in radial slots in guide plates 24a, 24b. The formers 15 and plungers 14 are biased inwards by return springs 25.

The device also incorporates a trolley or carriage 18 on which the assembly shown in Figure 2 is mounted. The carriage or trolley

no sleeve

stopped expansion  
 - no rolling  
 - for making butt welded  
 tubes round - not complicate

is provided with load-supporting wheels 19 at its base and with a spring loaded jockey wheel 20 at its top, wheels 19 being adjustable by means 26. Wheels 19 and 20 are desirably arranged to engage the pipe interior at the three corners of a triangle as viewed in the axial direction of the pipe. It will be seen that wheels 19 and 20 engage the pipe interior at opposed locations, and spring means 20a is provided for urging the opposed wheels apart.

The distributor 12, attached to the central body 11, is also attached to a forward extension 22 provided with a towing ring 23 to which a pull can be applied to pull the device along the pipe from weld to weld. The pull applied to ring 23 is transmitted by extension 22 and distributor 12 to the central body 11, and to the formers 15 through the rams 10 and their plungers 14. The front plate 24a is connected to extension 22 by spider arms 21, thence the pull is transmitted to the formers 15 through headed guide bolts 17a which extend through guide slots in the plate and are screwed into the formers, there being a sufficient clearance between the face of the formers and the heads of the bolts to enable the formers to slide freely. From the formers, the pull is transmitted to the rear plate 24b and to carriage 18 (to which that plate is fixed) by a similar arrangement of bolts 17b.

The formers may be provided with a peripheral groove 15a to accommodate the weld. The hydraulic connections which supply the hydraulic fluid from a pump are indicated at 27.

The device is provided with a safety brake, indicated generally at 28 in Figure 1 and shown in greater detail in Figure 3, for preventing it from running back down the pipe should it come adrift from the operator. The rear plate 18a of the trolley 18 has posts 29 on which toggle links 30 are mounted by pin and slot connections 31. At its outer, rear end, each link 30 carries a pivoted brake pad 32 shaped to the internal contour of the pipe (the latter being indicated at 33 in Figure 3). The links are pivoted together, and to a member 34, by pivot 35 at an intermediate point in their length, and member 34 is biased rearwards by a tension spring 36 extending between it and rear plate 18a. It will be seen that spring 36 urges the brake pads 32 outwards into contact with the interior surface of the pipe and any backward movement of the device along the pipe causes the brake pads to wedge against the pipe. The forward ends of the links are connected by a stirrup 37 which in turn is connected by a tie rod 38 to a lever 39 pivoted to the central body 11, and from lever 39 a brake wire 40 is carried along the extension

22 to a point convenient to the operator. Thus by pulling on the wire the operator can release the brake when it is desired to pull the device forward along the pipe.

In modification which is not illustrated, there are two series of radial jacks, each jack carrying a former and all the jacks being mounted on the central block 10, which is provided with two distributors although a single distributor serving both series of rams may be employed.

The rams and formers of the two series may be in register or they may be off-set or staggered. The two series of rams may be operated simultaneously, or one series after the other.

In a device having a single series of rams and formers, the central body 11 may be mounted in the carriage by any suitable means other than those illustrated. The towing connection may be attached to the front end of body 11 or may be connected to the carriage by connections extending through the spaces between the rams.

#### WHAT WE CLAIM IS:—

1. A device for correcting out-of-roundness in pipes and for conforming the internal periphery thereof to a substantially circular cross-sectional shape, which device is adapted to be received in the pipe and to be moved lengthwise along it and comprises a trolley or carriage constructed to be supported by said internal periphery, a series of radiating hydraulic rams on the carriage or trolley and a circumferential series of formers connected to the rams for radial projection within the pipe by operation of the rams, each of which formers has an arcuate outer peripheral surface conforming to an arc of the desired circle which peripheral surfaces, in the projected position, constitute successive and closely adjacent arcs of that circle.
2. A device according to Claim 1, wherein the carriage or trolley is provided with wheels for engaging the interior of the pipe.
3. A device according to Claim 2, having wheels for engaging the pipe interior at opposed locations, and spring means for urging the opposed wheels apart.
4. A device according to any of the preceding Claims, having an automatically applied but releasable brake for engaging the pipe interior and thereby preventing the device from running back.
5. A device according to any of the preceding Claims, having two series of radial jacks and formers.
6. A device according to any of the preceding Claims, having a towing ring to which a pull can be applied to pull the device along the pipe.
7. A device for correcting out-of-roundness

in pipes and for conforming the internal periphery thereof to a substantially circular cross-sectional shape, substantially as described herein with reference to the accompanying  
5 drawings.

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Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1970.  
Published by The Patent Office, 25 Southampton Buildings, London WC2A 1AY, from  
which copies may be obtained.

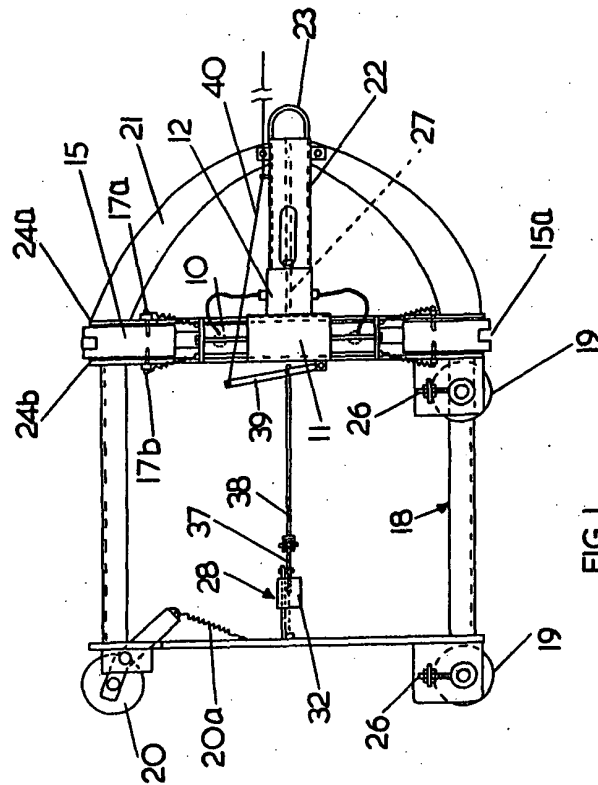


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COMPLETE SPECIFICATION

3 SHEETS

This drawing is a reproduction of  
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Sheet 1





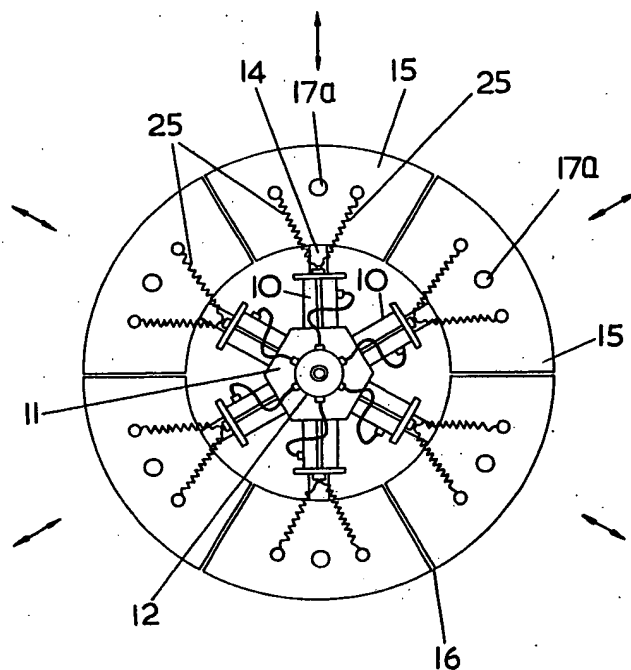


FIG. 2.





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COMPLETE SPECIFICATION

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Sheet 3

